

REMARKS

I. Introduction

By the present Amendment, claims 39, 42, and 45 have been amended. Claims 48-50 have been cancelled. Accordingly, claims 39-47 remain pending in the application. Claims 39 and 45 are independent.

II. Objections to the Claims

In the Office Action of July 13, 2007, claims 43 and 49 were objected to under 37 CFR §1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim. Regarding this objection, the Office Action indicates that claims 43 and 49 do not further limit the scope of claims 42 and 48 from which they respectively depend.

The cancellation of claims 48 and 49 has rendered part of this ground of objection moot. Regarding claim 43, Applicants have made amendments to claims 42 so that claim 43 further limits its scope. Withdrawal of this objection is therefore respectfully requested.

III. Rejections under 35 USC §103

Claims 39-50 were rejected under 35 USC §103(a) as being unpatentable over Fukuda in view of U.S. Patent No. 6,921,724 issued to Kamp et al. This rejection is respectfully traversed.

In rejecting the claims, the Office Action alleges that Fukuda discloses a plasma processing method that comprises all of the steps recited in the claimed invention. The Office Action admits that Fukuda fails to expressly teach processing upper and lower films on a specimen with different temperature profiles, as well as

the temperature settings being adjusted based on information obtained before processing the specimen. Kamp is relied upon for disclosing these particular features.

By the present Amendment, Applicants have amended the claims to better define the invention and identify features that are not disclosed or suggested by the art of record. As amended, independent claim 39 defines a plasma processing method that comprises:

a step of locating a specimen on a specimen table provided inside a processing chamber, a step of supplying a processing gas during evacuating inside of the processing chamber from the lower portion thereof, a step of generating plasma inside the processing chamber to process a plurality of films stacked on the specimen, wherein the specimen table comprising a dielectric film comprising an upper surface of the specimen table on which the specimen is located and a central channel disposed in a central portion of a heat conductive block of the specimen table, an outer circumferential channel in an outer circumferential portion of the metal block and a ring-like part with a lower heat conductivity than that of the heat conductive block suppressing a heat conduction between the central portion and the outer circumferential portion thereof disposed between the central channel and the outer circumferential channel inside the heat conductive, the plasma processing method further comprising:

a step of circulating coolant inside each of the central channel and the circumferential channel, the temperature of the coolant in the central channel is adjusted higher at a predetermined temperature difference than that of the coolant in the circumferential channel;

a step of absorbing electrostatically the specimen on the dielectric film and holding the specimen thereon;

a step of supplying the heat conductive gases to spaces between the specimen rear surface and the dielectric film, the spaces being constituted to independent spaces of a central space and an outer circumferential space by a ring-like protrusion which is disposed on the dielectric film at a position above the ring-like part inside of the heat conductive block and contacts closely with the rear surface of the specimen by the electrostatic absorption, and adjusting a pressure of the heat conductive gas in the outer circumferential space to be higher than that of the heat conductive gas in the central space at a predetermined value of a pressure difference; and

after processing an upper film of the plurality of films on the specimen while maintaining the temperatures of the coolant and the pressures of the heat conductive gases, changing the value of the pressures of the heat conductive gases in the central space and the outer circumferential space, while the temperatures of the coolant is maintained, and processing a lower film of the plurality of films on the specimen.

According to at least one feature of independent claim 39, the specimen table comprises a dielectric film having an upper surface of the specimen table and a central channel that is disposed in a central portion of a heat conductive block thereof; an outer circumferential channel in an outer circumferential portion of the heat conductive block; and a ring-like part with a lower heat conductivity than that of the heat conductive block disposed between the central channel and the outer circumferential channel inside the heat conductive block in order to suppress heat conduction between the central portion and the outer circumferential portion. Further, according to independent claim 39, processing gas is supplied during evacuation of the processing chamber from a lower portion thereof and generating plasma inside the processing chamber to process a plurality of films that are stacked on the specimen. The specimen is also electrostatically adsorbed on the dielectric film. According to additional features, heat conductive gases are supplied to the spaces between the specimen rear surface and a dielectric film that comprises an upper surface of the specimen table. The spaces where the heat conductive gases are supplied are independent spaces that consist of a central space and an outer circumferential space by virtue of the ring-like protrusion which is disposed on the dielectric film at a position above the ring-like part inside the heat conductive block, and contacts the rear surface of the specimen. Further, the pressure of the heat conductive gas in the outer circumferential space is adjusted so that it is higher than

that of the heat conductive gas in the central space by a predetermined pressure difference. Additionally, after the upper film of the plurality of films on the specimen has been processed, the temperatures of the coolant and the pressures of the conductive gases are maintained. Subsequently, the value of the pressures of the heat conductive gases are changed in the central space and the outer circumferential space while the temperature of the coolant is maintained. The lower film of the plurality of films on the specimen is then processed.

The newly incorporated features do not appear to be disclosed in the combination of cited references.

It is therefore respectfully submitted that independent claim 39 is allowable over the art of record.

Claims 40-44 depend from independent claim 39, and are therefore believed allowable for at least the reasons set forth above with respect to independent claim 39. In addition, these claims each introduce novel elements that independently render them patentable over the art of record.

Independent claim 45 defines a plasma processing method that comprises the steps of:

a step of locating a specimen on a specimen table provided inside of a processing chamber, a step of supplying a processing gas during evacuation of the inside of the processing chamber from a lower portion thereof, step of generating plasma inside of the processing chamber to process a plurality of films stacked on the specimen, wherein the specimen table comprising a dielectric film comprising an upper surface of the specimen table on which the specimen is located and a central channel disposed in a central portion of a heat conductive block of the specimen table and an outer circumferential channel in an outer circumferential portion of the heat conductive block and a ring-like part with a lower thermal conductivity than that of the metal block suppressing a heat conduction between the central portion and the outer circumferential portion thereof disposed between the heat conductive block, the plasma processing method further comprising:

a step of circulating coolant inside each of the central channel and the outer circumferential channel, the temperature of the coolant in the central channel being adjusted higher than a predetermined temperature difference than that of the coolant in the circumferential channel;

a step of absorbing electrostatically the specimen on the dielectric film and holding the specimen thereon;

a step of supplying the heat conductive gases to spaces between the specimen rear surface and the dielectric film, the spaces is constituted to independent spaces of a central space and an outer circumferential space by a ring-like protrusion which is disposed on the dielectric film at a position above the ring-like part inside of the heat conductive block and contacts closely with the rear surface of the specimen by the electrostatic absorption, and adjusting a pressure of the heat conductive gas in the central space to be higher than that of the heat conductive gas in the outer circumferential space at a predetermined value of a pressure difference; and

after processing an upper film of the plurality of films on the specimen while maintaining the temperatures of the heat conductive block and the pressures of the heat conductive gases, changing the pressure difference of the heat conductive gases between the central space and the outer circumferential space smaller, while the temperatures of the portions of the heat conductive block is maintained and processing a lower film of the plurality of films on the specimen.

Independent claim 45 recites various features that are somewhat similar to those recited in independent claim 39. As previously discussed, these features do not appear to be shown or suggested by the art of record.

It is therefore respectfully submitted that independent claim 45 is allowable over the art of record.

Claims 46-47 depend from independent claim 45, and are therefore believed allowable for at least the reasons set forth above with respect to independent claim 45. In addition, these claims each introduce novel elements that independently render them patentable over the art of record.

IV. Conclusion


For the reasons stated above, it is respectfully submitted that all of the pending claims are now in condition for allowance. Therefore, the issuance of a Notice of Allowance is believed in order, and courteously solicited.

If the Examiner believes that there are any matters which can be resolved by way of either a personal or telephone interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

AUTHORIZATION

Applicants request any shortage or excess in fees in connection with the filing of this paper, including extension of time fees, and for which no other form of payment is offered, be charged or credited to Deposit Account No. 01-2135 (Case: 520.42565CX1).

Respectfully submitted,
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Dated: October 31, 2007